

Claims:

1. A method of printing media surface treatment for printing applications using water-based ink, said method comprising the steps of:
  - applying a pretreatment liquid comprising a polyvalent metallic salt and at least one of a polymer swelling reagent and a coalescence reagent on to a surface of a recording medium to provide a pretreated recording medium;
  - allowing said pretreatment liquid to partially dry;
  - printing an ink composition onto said pretreated recording medium; and
  - drying the pretreated recording medium having the ink composition thereon at high temperature.
2. The method of claim 1 wherein said application step includes applying with a rubbing motion.
3. The method of claim 1 wherein said application step applies a layer of up to approximately 10 $\mu$ m thickness when wet.
4. The method of claim 1 wherein said recording medium is non-porous.
5. The method of claim 4 wherein said recording medium is vinyl.
6. The method of claim 1 wherein said recording medium has low porosity.
7. The method of claim 6 wherein said recording medium is coated paper.
8. The method of claim 1 wherein said ink composition is comprised of a colorant and a resin.
9. The method of claim 8 wherein said resin is an acrylic resin comprising at least one acidic group.
10. The method of claim 8 wherein said resin is in an aqueous emulsion.

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11. The method of claim 8 wherein said resin is in an aqueous solution.
12. A pretreatment liquid for printing applications using water-based ink, said liquid comprising:
  - a polyvalent metallic salt and at least one of a polymer swelling reagent and a coalescence reagent.
13. The pretreatment liquid of claim 12 wherein said liquid is a solution.
14. The pretreatment liquid of claim 12 wherein said polymer swelling reagent is an organic phase emulsion in water, wherein at least one of said swelling reagent and said coalescence reagent are in said organic phase which is emulsified in water containing said polyvalent metallic salt.
15. The pretreatment liquid of claim 12 wherein said polyvalent metallic salt includes at least one of divalent and trivalent metallic cations.
16. The pretreatment liquid of claim 12 wherein said metallic cations are chosen from the group consisting of:  $\text{Ca}^{+2}$ ,  $\text{Zn}^{+2}$ ,  $\text{Ba}^{+2}$ ,  $\text{Mg}^{+2}$ ,  $\text{Al}^{+3}$ ,  $\text{Fe}^{+3}$  and  $\text{Cr}^{+3}$ .
17. The pretreatment liquid of claim 12 wherein said metallic cations are chosen from the group consisting of:  $\text{Ca}^{+2}$  and  $\text{Zn}^{+2}$ .
18. The pretreatment liquid of claim 17 wherein said calcium cation comprises between approximately 2% to approximately 25% of said pretreatment liquid.
19. The pretreatment liquid of claim 17 wherein said calcium cation comprises between approximately 3% to approximately 20% of said pretreatment liquid.
20. The pretreatment liquid of claim 17 wherein said zinc cation comprises between approximately 5% to approximately 20% of said pretreatment liquid.
21. The pretreatment liquid of claim 17 wherein said zinc cation comprises

between approximately 10% to approximately 17% of said pretreatment liquid.

22. The pretreatment liquid of claim 12 wherein said polyvalent metallic salt is comprised of an anion from the group of:  $\text{Cl}^-$ ,  $\text{I}^-$ ,  $\text{Br}^-$ ,  $\text{NO}_3^-$ ,  $\text{RCOO}^-$  and  $\text{SO}_4^{2-}$ .

23. The pretreatment liquid of claim 12 wherein said polyvalent metallic salt is comprised of an anion from the group of:  $\text{Cl}^-$  and  $\text{CH}_3\text{COO}^-$ .

24. The pretreatment liquid of claim 12 wherein said polymer swelling reagent is chosen from the group consisting of: N-methyl pyrrolidone, organic esters including, ethyl acetate, propyl acetate, butyl acetate, ethyl lactate, butyl lactate, ketones including acetone and methyl-ethyl-ketone and cyclic ethers including tetrahydrofuran.

25. The pretreatment liquid of claim 12 wherein said polymer swelling reagent comprises between approximately 0.1% to approximately 15% by weight of said pretreatment liquid.

26. The pretreatment liquid of claim 12 wherein said polymer swelling reagent comprises between approximately 0.5% to approximately 7.5% by weight of said pretreatment liquid.

27. The pretreatment liquid of claim 12 wherein said coalescence reagent is chosen from the group consisting of: butyl glycol, butyl carbitol, glycol ethers including: di(propylene glycol) methyl ether, tripropylene glycol mono methyl ether, propylene glycol mono methyl ether, propylene glycol mono propyl ether, and dipropylene glycol dimethyl ether.

28. The pretreatment liquid of claim 12 wherein said coalescence reagent comprises between approximately 0.1% to approximately 15% by weight of said pretreatment liquid.

29. The pretreatment liquid of claim 12 wherein said coalescence reagent comprises between approximately 0.5% to approximately 6% by weight of said

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pretreatment liquid.

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